What is claimed is:

1. A substrate processing chamber comprising:

(a) a support;

(b) a gas distributor;

(c) a gas energizer;

(d) a wall comprising a radiation transmitting portion;

(e) a mask overlying the radiation transmitting portion, the mask having an aperture; and

(e) an exhaust,

whereby a substrate held on the support may be processed by process gas distributed by the gas distributor, energized by the gas energizer, and exhausted by the exhaust, and whereby the mask is adapted to reduce deposition of process residue on the radiation transmitting portion and whereby radiation may be transmitted through the aperture of the mask and the radiation transmitting portion.

2. A substrate processing chamber according to claim 1 wherein the mask comprises an aperture having an aspect ratio that is sufficiently large to reduce access of process gas to the radiation transmitting portion.

3. A substrate processing chamber according to claim 1 wherein the mask comprises an aperture having an aspect ratio of from about 1:1 to about 12:1.

4. A substrate processing chamber according to claim 1 wherein the mask comprises an aperture having an aspect ratio that is sufficiently small to allow ions of the energized process gas to enter the aperture and etch away the process residue formed on a sidewall of the aperture and on the radiation transmitting portion.

5. A substrate processing chamber according to claim 1 wherein the mask comprises an aperture having an aspect ratio of from about 0.25:1 to about 3:1.

6. A substrate processing chamber according to claim 1 wherein the mask comprises an aperture having a diameter or width of from about 0.1 to about 50 mm, and a height of about 0.5 to about 500 mm.

7. A substrate processing chamber according to claim 1 wherein the mask comprises an array of hexagonal apertures.

8. A substrate processing chamber according to claim 1 wherein the mask comprises a material that is resistant to erosion by the process gas.

9. A substrate processing chamber according to claim 8 wherein the mask comprises one or more of Al_2O_3, SiO_2, AlN, BN, Si, SiC, Si_3N_4, TiO_2, or ZrO_2.

10. A substrate processing chamber according to claim 1 further comprising an electrical field source that is adapted to couple electrical energy to the wall to reduce deposition of the process residues on the wall.

11. A substrate processing chamber according to claim 1 further comprising a magnetic field source adapted to provide a magnetic flux across the wall to reduce deposition of process residues on the wall.

12. A substrate processing chamber comprising:

(a) a support having a receiving surface capable of supporting a substrate;

(b) a gas distributor capable of providing process gas in the chamber and a gas energizer that is capable of coupling energy to the process gas;

(c) a radiation transmitting portion that allows radiation to be transmitted therethrough to monitor processing of the substrate;

(d) means extending into the interior of the chamber for reducing deposition of process residue from process gas on the radiation transmitting portion; and

(e) an exhaust capable of exhausting process gas from the chamber.

13. A substrate processing chamber according to claim 12 wherein the means for reducing deposition of process residue on the radiation transmitting portion comprises means for controlling access of energized process gas species to the radiation transmitting portion.

14. A substrate processing chamber according to claim 12 wherein the means for reducing deposition of process residue on the radiation transmitting portion comprises a mask capable of masking the radiation transmitting portion from the energized process gas.

15. A substrate processing chamber according to claim 12 wherein the means for reducing deposition of process residue on the radiation transmitting portion comprises an overlying mask having apertures with an aspect ratio of from about 1:1 to about 12:1.

16. A substrate processing chamber according to claim 15 wherein the mask comprises an aperture having an aspect ratio of from about 0.25:1 to about 3:1.

17. A substrate processing chamber according to claim 12 further comprising an electrical field source that couples electrical energy to the radiation transmitting portion to further reduce deposition of process residues on the radiation transmitting portion.

18. A substrate processing chamber according to claim 12 further comprising a magnetic field source adapted to provide a magnetic flux across the radiation transmitting portion to further reduce the deposition of process residues on the radiation transmitting portion.

19. A substrate processing chamber comprising:

(a) a support;

(b) a gas distributor;

(c) a gas energizer;

(d) a radiation transmitting portion comprising a mask with a plurality of apertures; and

(e) an exhaust;

whereby a substrate held on the support may be processed by process gas distributed by the gas distributor, energized by the gas energizer, and exhausted by the exhaust, and whereby radiation may be transmitted through the radiation transmitting portion.

20. A substrate processing chamber according to claim 19 wherein the apertures have aspect ratios that are sufficiently large to reduce access of process gas to the radiation transmitting portion.

21. A substrate processing comprising:

(a) a support;

(b) a gas distributor;

(c) a gas energizer;

(d) a wall comprising an aperture, the aperture having an aspect ratio selected to reduce deposition of process residue;

(e) an exhaust; and

(f) a process monitoring system,

whereby a substrate held on the support may be processed by process gas distributed by the gas distributor, energized by the gas energizer, and exhausted by the exhaust, and whereby radiation may be transmitted through the aperture to the process monitoring system.

22. A substrate processing chamber according to claim 21 wherein the wall comprises a radiation transmitting portion.

23. A substrate processing chamber according to claim 21 wherein the aspect ratio is sufficiently large to reduce access of process gas to the radiation transmitting portion.

24. A substrate processing chamber according to claim 21 wherein the wall comprises a mask.

25. A substrate processing chamber according to claim 24 wherein the mask blocks an otherwise exposed portion of a radiation transmitting portion.

26. A window capable of being mounted on a process chamber, the window comprising:

a radiation transmitting portion and

an overlying mask with an aperture,

whereby the mask is adapted to reduce deposition of process residue on the window and whereby radiation may be transmitted through the window when a substrate is processed in the process chamber.

27. A window according to claim 26 wherein the mask comprises an aperture having an aspect ratio that is sufficiently large to reduce access of process gas to the radiation transmitting portion.

28. A window according to claim 26 wherein the mask comprises an aperture having an aspect ratio of from about 1:1 to about 12:1.

29. A window according to claim 26 wherein the mask comprises an aperture having an aspect ratio that is sufficiently small to allow ions of an energized process gas to enter the aperture and etch away the process residues formed on a sidewall of the aperture and on window.

30. A window according to claim 26 wherein the mask comprises an aperture having an aspect ratio of from about 0.25:1 to about 3:1.

31. A window according to claim 26 wherein the mask comprises an aperture having a diameter or width of from about 0.1 to about 50 mm, and a height of about 0.5 to about 500 mm.

32. A window according to claim 26 wherein the mask comprises a material that is resistant to erosion by a process gas.

33. A window according to claim 26 wherein the mask comprises a plurality of apertures.

34. A window according to claim 26 wherein the mask comprises an array of hexagonal apertures.

35. A window according to claim 26 wherein the mask comprises one or more of Al_2O_3, SiO_2, AlN, BN, Si, SiC, Si_3N_4, TiO_2, or ZrO_2.

36. A window according to claim 26 wherein the radiation transmitting portion is absent a heating element for heating the radiation transmitting portion.

37. A window according to claim 26 further comprising an electrical field source that is adapted to couple electrical energy to the radiation transmitting portion to reduce deposition of the process residues on the radiation transmitting portion.

38. A window according to claim 26 further comprising a magnetic field source adapted to provide a magnetic flux across the radiation transmitting portion to reduce deposition of process residues on the radiation transmitting portion.

39. A method of processing a substrate in a process chamber, the method comprising the steps of:

(a) placing the substrate in the process chamber;

(b) maintaining first process conditions in the process chamber to process the substrate, the first process conditions including providing an energized process gas in the process chamber;

(c) masking a radiation transmitting portion in a wall of the process chamber to reduce deposition of process residue on the radiation transmitting portion and measuring a property of radiation transmitted through the radiation transmitting portion; and

(d) changing the first process conditions to second process conditions in relation to the measured property of the transmitted radiation.

40. A method according to claim 39 further comprising the step of directing an incident light beam through the radiation transmitting portion to be incident on the substrate and measuring a property of a reflected light beam that is reflected from the substrate and transmitted through the radiation transmitting portion.

41. A method according to claim 39 wherein the first process conditions comprise process conditions suitable for etching the substrate, and the second process conditions comprise process conditions suitable for stopping the etching process or changing a rate of etching of the substrate.

42. A method of processing a substrate in a process chamber, the method comprising the steps of:

(a) placing the substrate in the process chamber;

(b) maintaining process conditions in the process chamber to process the substrate, the process conditions including providing an energized process gas in the process chamber; and

(c) maintaining a magnetic flux across a portion of a wall of the process chamber.

43. A method according to claim 42 wherein the portion of the wall comprises a radiation transmitting portion.

44. A method according to claim 42 wherein step (c) comprises the step of maintaining a magnetic flux that is sufficiently high to reduce the deposition of process residue on the portion of the wall.

45. A method according to claim 42 wherein step (c) comprises the step of maintaining a magnetic flux having a magnetic field component that is substantially parallel to a plane of the portion of the wall.

46. A method according to claim 42 wherein step (c) comprises the step of maintaining a magnetic flux that is localized across a radiation transmitting portion of the wall, and comprises a higher magnetic flux across the radiation transmitting portion than across other portions of the chamber.

47. A method according to claim 42 wherein step (c) comprises the step of maintaining a plurality of magnetic poles about a perimeter of a radiation transmitting portion of the wall.

48. A method according to claim 42 wherein step (c) comprises the step of maintaining opposing magnetic poles that face one another around a perimeter of a radiation transmitting portion of the wall.

49. A method according to claim 42 wherein step (c) comprises the step of maintaining a magnetic flux having a magnetic field component that is substantially parallel to a plane of a radiation transmitting portion of the wall.

50. A method according to claim 42 wherein step (c) comprises the step of maintaining a magnetic flux that extends across a surface of a radiation transmitting portion of the wall.

51. A method according to claim 42 further comprising the step of providing a mask covering a radiation transmitting portion of the wall, the mask comprising an aperture that allows radiation to pass through.

52. A method of processing a substrate in a process chamber, the method comprising the steps of:

(a) placing the substrate in the process chamber;

(b) maintaining first process conditions in the process chamber to process the substrate, the first process conditions including providing an energized process gas in the process chamber;

(c) maintaining a magnetic flux across at least a portion of a radiation transmitting portion in a wall of the process chamber;

(d) measuring a property of radiation transmitted through the radiation transmitting portion; and

(e) changing the first process conditions to second process conditions in relation to the measured property of the transmitted radiation.

53. A method of processing a substrate in a process chamber, the method comprising the steps of:

(a) placing the substrate in the process chamber;

(b) maintaining process conditions in the process chamber to process the substrate, the process conditions including providing an energized process gas in the process chamber; and

(c) electrically biasing a portion of a wall of the process chamber.

54. A method according to claim 53 wherein the portion of the wall comprises a radiation transmitting portion.

55. A method according to claim 53 wherein step (c) comprises the step of electrically biasing the portion of the wall by a voltage that is sufficiently high to reduce deposition of process residue on the portion of the wall.

56. A method according to claim 53 wherein step (c) comprises the step of maintaining an electrode or coil adjacent to the portion of the wall, the electrode or coil being sized to provide an electrical flux across a surface of the portion of the wall.

57. A method according to claim 56 comprising the step of powering the electrode or coil with D.C., A.C., or R.F. energy.

58. A method according to claim 53 further comprising the steps of measuring a property of radiation transmitted through a radiation transmitting portion, and changing the process conditions in relation to the measured property of the transmitted radiation.